BUILDING OUR **ENVIRONMENT,** TOGETHER

SAINT-GOBAIN

SAINT-GOBAIN

CONTENTS

Editorial

As the world leader in products for the construction market, Saint-Gobain has set its sights on providing innovative solutions to two key challenges of the future: environmental protection and energy saving.

Because buildings are responsible for one quarter of all CO_2 emissions, particularly in Europe, this is an area offering a genuine opportunity for Saint-Gobain. Our Group already offers high-performance energy-saving solutions through an extensive range of products: low-emission double glazing to limit the transfer of heat and solar radiation, mineral wool and other increasingly efficient insulating materials, as well as plasterboard-based systems.

In the near future Saint-Gobain will produce glass-based photovoltaic panels and new electronic lighting to replace traditional bulbs. Further down the line, it will produce ceramic-based fuel cells as a backup power source in homes and for water heaters.

Making buildings more energy efficient is at the heart of our strategy. Saint-Gobain wishes to go even further and has set itself the inspiring challenge of building "the house of the future".

Respect for the environment is currently an all-encompassing concern. This is enshrined in the Group's core values, as set out in our Principles of Conduct and Action. Saint-Gobain has also signed the United Nations Global Compact, under which it is committed to adopting a precautionary approach to key environmental challenges. It is also committed to undertaking initiatives that support more environmentally responsible practices, and encouraging the development and dissemination of environment-friendly technologies.

Saint-Gobain offers enhanced solutions by striving to help protect the environment while at the same time improving comfort and quality of life.

As the following pages illustrate, the wealth and diversity of Saint-Gobain's businesses enable it to bring concrete answers to these challenges.

Keenly aware that the future of the planet is in the hands of each and every one of us, we are fully committed to making respect for the environment an ever more central part of all our manufacturing activities and services.

Pierre-André de Chalendar
Chief Executive Officer of Compagnie de Saint-Gobain

0.3%

Saint-Gobain's emissions remains marginal, accounting for only 0.3 % of quotas allocated in Europe and amounting to less than 15 million metric tons in 2006

12bn

A saving of 12 billion tons of CO_2 is possible by using a year's production of Saint-Gobain insulating material in the home

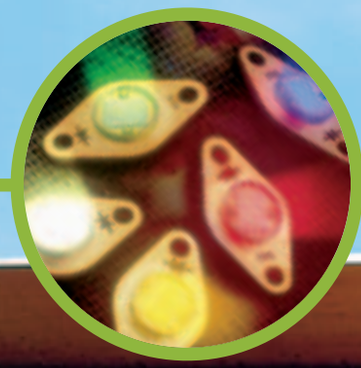
7.4M

Saint-Gobain used 7.4 million metric tons of recycled glass in 2007

HOME AND **LIVING ENVIRONMENT**

Products and services that help save energy and preserve the environment

Buildings are responsible for a quarter of CO_2 emissions in Europe. Studies show that hot water, home appliances and lighting only account for 25% of a building's average energy consumption, while heating alone accounts for the remaining 75%. The main cause of this imbalance is inadequate insulation. During the winter, heat escapes while in summer the cooler indoor air is quickly warmed, both of which drive up energy requirements. By improving the insulating envelope it is possible to reduce energy losses and thereby shrink energy consumption by up to 75% or even 90%. This involves changes in the approach to construction methods and the use of renewable energies. Saint-Gobain designs and sells products and services that meet these challenges.



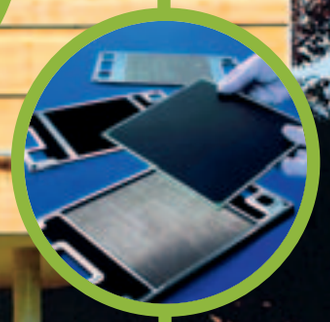
Energy-efficient lighting

Solar energy,
an alternative to fossil fuels

Particulate filters

Insulation,
the environment's
greatest ally

Improved
automotive
glazing



Sustainable
management
of wood is
gaining ground

Major steps forward
for acoustic comfort

Facilitating
water supply
and treatment

Fuel cells –
improving energy
efficiency

MATERIALS FOR **BUILDINGS AND THE ENVIRONMENT**

Insulation, the environment's greatest ally

A building's energy efficiency hinges mainly on the quality of its insulation.

If all existing buildings in Europe were to be properly insulated, there could be potential energy savings of
3.3 million barrels of oil
per day(1).

SAINT-GOBAIN, **THE WORLD LEADER IN INSULATION**

Through its **Isover** brand, Saint-Gobain offers insulation systems specifically designed for roofs, walls, partitions, floors, pipes, and ventilation ducts. Many of these applications use **glass wool**, a material that has a very limited environmental footprint over its entire life cycle.
Through the heat savings it makes possible, glass wool saves up to 1,000 times the amount of CO_2 emitted and energy used during its manufacture.
Although these products are hidden from view, they are all around us, helping to preserve the environment.

Homes built pre-1975.	Current European standards.	European standards in 2010.	Low-consumption homes.
Annual cost to heat 100 sq. m.*			
€2,210	**€1,000**	**€360**	**€120**

(1) Saint-Gobain estimate based on oil prices of $90 per barrel.

Spotlight on...

> Increasingly efficient insulation

The heat resistance of glass wool has increased by 20% in the space of 10 years,meaning that the same width of glass wool can now provide significantly more thermal protection for partition walls.

GLAZING IS ESSENTIAL TO **THE EFFICIENT INSULATION OF A BUILDING**

According to the European Association of Flat Glass Manufacturers, the building sector emits 765 million metric tons of CO_2 per year. If double glazing with **reinforced thermal insulation** were to come into general use in Europe, CO_2 emissions could potentially be reduced by 140 million metric tons per year[2].

Households that replace single glazing by double glazing with reinforced thermal insulation see a return on investment in about three and half months, thanks to lower heating bills. Bearing in mind that the lifespan of flat glass is approximately 30 years, the potential savings for end users are considerable.

The thermal insulation provided by low-emission double glazing is three times more efficient than that of standard double glazing. This is thanks to an invisible metallic layer applied to one of the two glass panes, which acts as a thermal barrier.

Saint-Gobain's Flat Glass Sector has designed the SGG PLANITHERM ULTRA N glass, which boasts one of the lowest heat loss ratings worldwide. Thanks to major research efforts, the Group has increased the overall energy efficiency of its flat glass six-fold within the last 20 years. Triple glazing could become the insulation solution of the future.

The energy efficiency of insulating glass has increased six-fold in 20 years.

Glazing
Planitherm Futur.

(2) Saint-Gobain estimate.

Insulation, the environment's greatest ally

The Integra Vario system improves thermal insulation performance thanks to its "smart membrane".

OTHER THERMAL **INSULATION SYSTEMS**

The Group's external thermal insulation systems (SG Isover, SG Gypsum, SG Weber and SG Technical Fabrics) along with Lapeyre windows fitted with Saint-Gobain glass, offer an exceptional insulating system for buildings.

For roofs, Isover's Integra system combines high-performance insulation with a Vario Duplex weather-responsive membrane. This system not only provides advanced thermal and acoustic protection, but also helps prevent moisture from spreading and keeps buildings airtight.

The fireproof properties of mineral wool, plaster and cast iron pipes contribute significantly to the safety and comfort of homes.

ULTIMATE

A NEW GENERATION OF **GLASS WOOL**

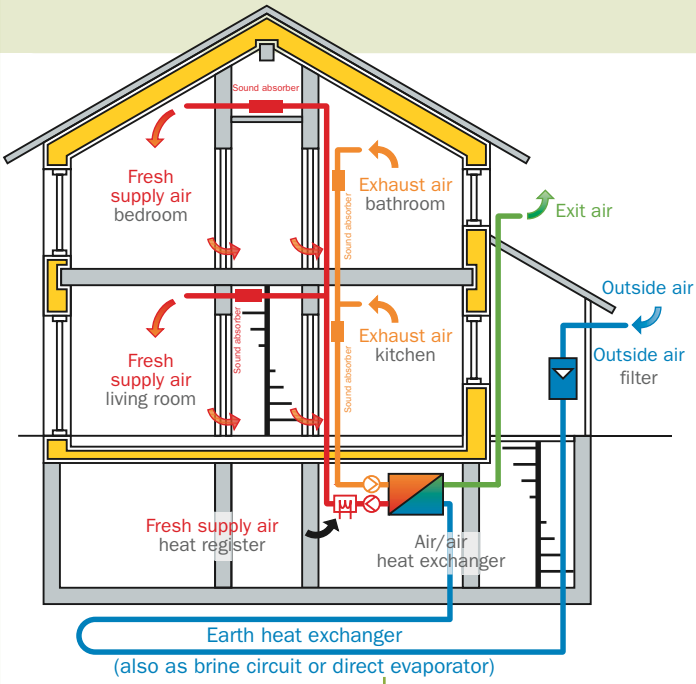
ULTIMATE has been specifically designed for ever-greater safety. It is resistant to high temperatures and can serve as a fireproof barrier.

Its lightweight quality allows for energy savings. It can also be used to make ducting airtight and watertight in air conditioning systems and industrial or domestic hot water piping systems.

Spotlight on...

> Isover has launched the “Multi-Comfort House” concept

Thanks to carefully selected high-efficiency components that include optimal thermal insulation, superinsulating windows and heat recovery systems, Saint-Gobain’s Multi-Comfort House can almost do without any form of active heating. The house’s main heat sources are two renewable and inexhaustible natural energies—the sun, and heat recovered from recycled air. As a result, the Multi-Comfort House consumes only 1.5 liters of fuel per square meter per year for heating. In comparison, old buildings require approximately 20 liters and new houses based on traditional models consume 6 to 10 liters.



An optimal interior climate thanks to an air recycling system.

“Passive house” by architects Proyer & Proyer in Steyr, Austria.

Major steps forward for acoustic comfort

A building that is well insulated against heat and cold, thanks to the combination of Saint-Gobain products, is also well insulated against noise.

All of Saint-Gobain's acoustic insulation products can be fully recycled at the end of their lifespan.

> **Acoustic** comfort

By developing specific acoustic comfort categories or "classes", Saint-Gobain Isover is asserting its leadership in the acoustic insulation field and advocating stricter regulations. More than 60% of European residents complain about noise from their neighbors and from traffic. Several solutions have been developed for floors, walls, roofs, and ventilation ducts in residential and business premises.

HIGH PERFORMANCE **ACOUSTIC INSULATION PRODUCTS**

Using Saint-Gobain products means benefiting from energy savings, thermal and acoustic comfort, and interior air quality. A combination of mineral wool and plasterboard, for example, yields optimal insulation performance. Furthermore, all of these products can be fully recycled at the end of their lifespan.

- **Saint-Gobain Ecophon** and **Saint-Gobain Eurocoustic** manufacture soundproof ceilings and noise-absorbent panels for private homes as well as for public buildings, such as schools, hospitals and offices.
- **Saint-Gobain Gypsum,** known for its high-performance partition walls (used in multiplex cinemas, recording studios and more), has developed several products designed to enhance acoustic comfort.
- **The GypBox** (box within a box) by Gyproc, a complete tailor-made solution ideal for renovation projects, enables buildings to be brought up to new acoustic insulation standards. Within the room, it fits onto metal frames that are included with the plasterboard for a quick and easy installation.

Ecophon: Fitting a Focus DG ceiling.

ADVANCES MADE **IN ACOUSTIC COMFORT…**

Placo® Phonique (Soundblock® in the UK), the number one acoustic plasterboard in France for domestic use, represents a major step forward for acoustic comfort as partition walls, ceilings and drylining. Placo® Phonique improves noise reduction performance by three decibels (50%) in comparison with the same applications made with standard plasterboard on metal frames. The middle layer of Placo® Phonique is made from a specific crystal structure of gypsum with entirely natural components that absorb noise and offer remarkable insulation gains.

…IN HOMES **AND CARS**

The **Flat Glass Sector** develops acoustic insulation products for homes (SGG STADIP SILENCE®) and for the automotive industry (SGS dBCONTROL®). Half of the noise heard inside vehicles comes in through the windshield. By using acoustic glass, Saint-Gobain significantly improves comfort by dampening outside noise, in particular from the wind and from engine vibrations. In recent years, Saint-Gobain has been responsible for most of the progress achieved in this area. Noise levels within vehicles have been reduced to seven decibels, notably thanks to PVB, a new laminated glass process.

…IN **BUILDINGS**

Reducing the noise caused by drainage systems is the concern of **Saint-Gobain PAM.** All of its drainage pipes for buildings are made from cast iron, which generates less noise than PVC pipes (around five decibels lower). Research has led to such pipes being rendered almost silent. Thanks to **PAM'Acoustic** innovation, the noise levels of cast iron pipes reach a maximum of 11 decibels, i.e. 19 decibels lower than French legal requirements regarding so-called "silent rooms"(1). The noise caused by cars when they drive over manhole covers is a common source of noise pollution. Saint-Gobain PAM has been at the forefront of considerable progress in this area thanks to the **Pamrex®** product and its absorbent, hardwearing and durable elastomer seal.

(1) According to the acoustic regulations issued in 2000 in France, so-called "silent rooms" are rooms in which noise levels must be below 30 decibels, such as entrance halls, bedrooms (including those in certain public establishments such as hotels, hospitals, etc.), classrooms or study rooms (in schools, universities or similar) as well as offices, meeting rooms, conference rooms or any other place of work.

Spotlight on…

> SGG Bioclean®

Saint-Gobain's self-cleaning glass takes the hard work out of cleaning windows, saves water and cuts down on the use of detergents. Using SGG Bioclean® would save between 4,500 and 16,000 liters of water (depending on the type of house and the window surface area) during the life of a building (an estimated 60 years on average). This is the equivalent of 30 to 100 days' drinking water supply for one European resident. For business premises, using SGG Bioclean® would save between 50,000 and 100,000 liters, or one to two years' worth of drinking water for one European.

Sustainable management of wood is gaining ground

Wood is widely used in the home improvement and construction industries, in the form of parquet flooring, shutters, windows, stairs, and façades. However, wood is also a fragile natural resource that should be preserved.

Timber-frame construction is now used in 7% of individual houses in France.

PROMOTING **TIMBER-FRAME HOUSES**

The Saint-Gobain Group's Mobissimo brand in France and Optimera Precut brand in Norway offer a range of environmentally friendly products and services. All of the wood in the range is sourced from sustainably managed forests. Saint-Gobain takes the sustainable management of wood into consideration in the wood products it designs and markets, as illustrated by the innovative **Woodprotect®** treatment and the **Mobissimo** range, which promotes timber-frame construction—a more energy-efficient, lighter and faster building technique now used in 7% of individual houses in France.

> Woodprotect®

Six years of Research and Development efforts have enabled teams at Lapeyre to design Woodprotect®, a revolutionary in-depth treatment that protects timber from dampness, insects, mold and UV rays, and endows it with an unprecedented durability and lifespan.

Woodprotect® can be applied to all types of wood, is totally colorless and does not change the appearance of the wood in any way. Woodprotect® is 100% natural and has no impact on flora and fauna.

Energy-efficient lighting

Light Emitting Diodes (LEDs) will eventually replace traditional incandescent bulbs.

SAPPHIRE SUBSTRATES
THE SOLUTION OF THE FUTURE

Saint-Gobain develops other products that contribute to energy savings, in particular sapphire substrates, which are used when manufacturing **LEDs** for display and lighting applications. The light that they produce is close to that of natural daylight, but they consume five times less energy and last 100 times longer than traditional bulbs. LEDs look set to eventually replace traditional incandescent bulbs.

Spotlight on...

> Saint-Gobain joins forces with BluGlass
to develop LEDs

Saint-Gobain has signed a partnership agreement with the Australian start-up BluGlass on the development of low-cost glass-substrate LEDs, a project that could accelerate the large-scale take-up of LEDs in general domestic lighting applications.

MATERIALS THAT **PROMOTE RENEWABLE ENERGIES**

Solar energy, an alternative to fossil fuels

Saint-Gobain contributes to the development of alternatives to fossil fuels, and particularly helps promote the wider use of renewable energies.

In 2006, Saint-Gobain and Shell launched a **joint venture, Avancis,** to manufacture photovoltaic cells that convert solar energy into electricity using a new thin-layer based technology. Initial capacity will be 20 megawatts. Production will get underway in Germany in 2008.

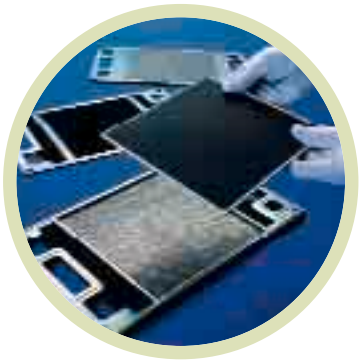
The Group is already a major supplier of products for the **photovoltaic industry,** including SGG DIAMANT and SGG ALBARINO high-efficiency glass.

Thermal solar collectors transform solar rays into hot water or heating. At the last Interclima trade show, Saint-Gobain Building Distribution exhibited a revolutionary prototype of a solar collector which was lightweight, 100% corrosion-proof and entirely recyclable. Several Group subsidiaries contributed to the development of this new generation solar collector.

Production will get underway in 2008 in Germany, with initial capacity of
20 megawatts.

Photovoltaic panels.

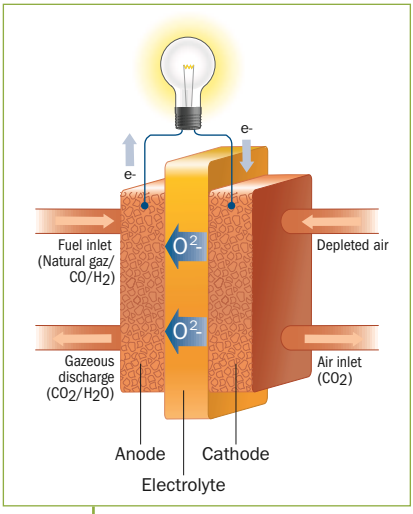
Fuel cells–improving energy efficiency



Saint-Gobain is designing new technologies with high energy-efficiency potential.

Solid-oxide fuel-cells (SOFCs) use functional ceramic layers to convert chemical energy directly into electrical power and heat. Combined heat and power systems (CHP) can achieve energy efficiencies of around 80%, compared to 30% to 40% for traditional gas- and coal-fired power plants.

In order to speed up development of this technology and shorten its time-to-market, the Northboro R&D center in the US has entered into a partnership agreement with Jülich, a German laboratory.



Fuel cells convert chemical energy into electrical power and heat.

> Saint-Gobain joins forces with start-ups on clean technologies

Saint-Gobain has signed a strategic partnership agreement with the Californian venture capital fund NGEN II, with the purpose of selecting and supporting start-ups in the fields of new energies, contaminated site remediation and sustainable housing.

By giving start-ups access to the industrial and distribution power of a leading global group, the aim is to gain faster access to breakthrough technologies and to initiate support and boost major innovation projects.

WATER TREATMENT **AND AIR PURIFICATION MATERIALS**

Facilitating water supply and treatment

Saint-Gobain is designing new materials in cast iron and quartz, as well as groundbreaking new systems.

THE BENEFITS **OF CAST IRON**

The intrinsic properties of cast iron, the base material of Pipe Division products, make it a natural choice for addressing issues of water preservation and quality. **Cast iron pipes** are naturally impermeable and guarantee the continued drinkability of water while preventing any leaks. When used to collect wastewater, cast iron pipes also prevent soil pollution and ensure that a maximum amount of wastewater is treated and recycled.

Access to drinking water is a vital requirement for the populations of emerging countries. That is why Saint-Gobain is developing a new high-performance range of large and small ductile cast iron pipes. Increasingly corrosion-resistant coatings improve the durability of pipes; simplified joints make the pipes easier to fit; and, for certain applications, new centrifuge techniques reduce the thickness of cast iron and the weight of pipes while maintaining performance.

Access to drinking water is vital.

The Ivoire system uses RFID chips to monitor the operation of water supply and drainage pipes.

THE ADVANTAGES **OF QUARTZ**

The latest innovation in the range of Saint-Gobain PAM products—**Ivoire®**—is an innovative system facilitating the management and control of Pamrex® underground water supply and drainage pipes, by means of RFID (radio frequency identification) chips that do not require an energy source to function. These chips improve the drainage network management by preventing overloading at wastewater treatment plants.

In domestic water treatment, Saint-Gobain supplies transparent **quartz tubes** for the ultra-violet treatment of wastewater, drinking water and swimming pool water. These tubes destroy bacteria without using environmentally dangerous chemicals.

The **High-Performance Materials Sector** has developed a photocatalytic air purification filter called Quartzel, which destroys organic matter (odors, smoke, viruses, bacteria, etc.), and is complementary to indoor filtration technologies used to clean air.

Saint Gobain PAM: pipe for supplying water to the cities of Algiers and Tizi Ouzou, in Algeria.

MATERIALS FOR **CLEANER VEHICLES**

Improved automotive glazing and lighter materials

Vehicles are heavy CO_2 emitters. To reduce these emissions, Saint-Gobain produces high-performance windshields and particulate filters for diesel engines.

The athermic windshield reduces CO_2 emissions.

Compared to a car equipped with a classic windshield, **Saint-Gobain Sekurit's** athermic windshield reduces air-conditioning by 20% and lowers energy consumption by 3%. It thus cuts CO_2 emissions by 200kg (440lbs) for every 100,000km (62,000 miles).

Tinted and reflective glass, as well as the thin automotive glass now entering the market, help car manufacturers rise to the challenge of producing lighter vehicles that consume less fuel.

To further enhance its offering Saint-Gobain has started major research work into the aerodynamics of automotive glass.

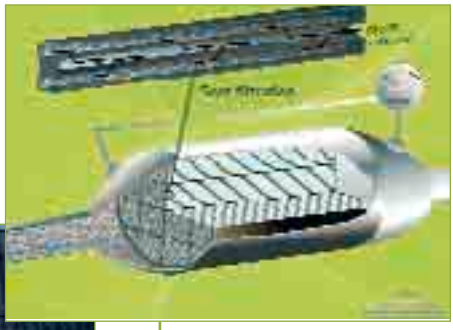
Saint-Gobain supplies the glass for one in every two cars in Europe.

Particulate filters

Saint-Gobain's particulate filters help reduce CO_2 emissions.

Diesel-powered vehicles emit less CO_2 than those with gasoline engines. Now, thanks to particulate filters, diesel emissions producing very fine soot can be trapped.

The Group started up a production line making silicon carbide particulate filters for diesel engines—**Ceraclean®**—in Rödental, Germany. This technology cuts out 99.99% of the soot particulates emitted by engines. Saint-Gobain products have already been selected by Ford and Volkswagen for several of their models in Europe.



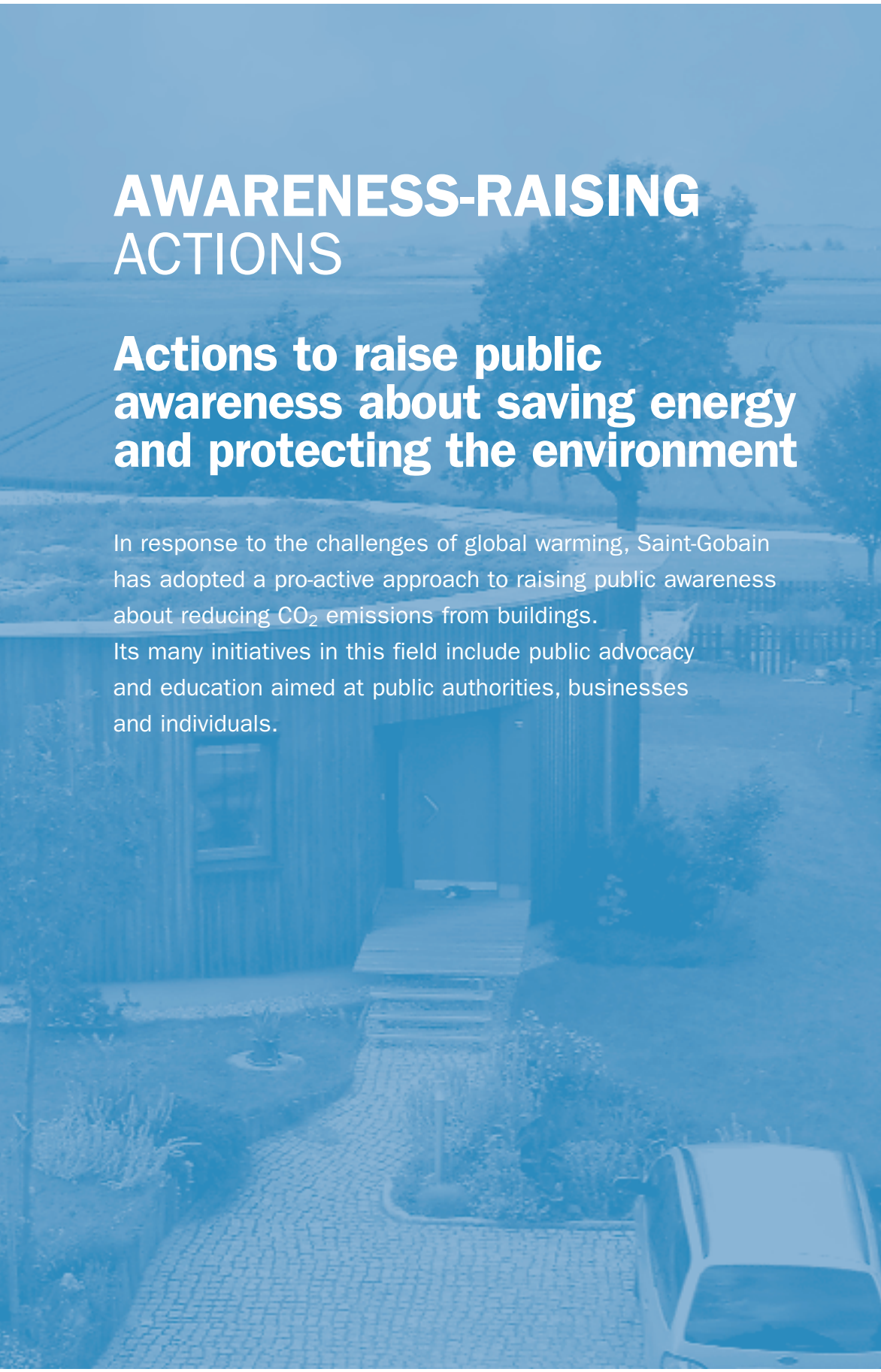
Saint-Gobain's particulate filters.

Ford Mondeo has been equipped with Saint-Gobain's particulate filter since 2006.

AWARENESS-RAISING ACTIONS

Actions to raise public awareness about saving energy and protecting the environment

In response to the challenges of global warming, Saint-Gobain has adopted a pro-active approach to raising public awareness about reducing CO_2 emissions from buildings.
Its many initiatives in this field include public advocacy and education aimed at public authorities, businesses and individuals.



effinergie

Incentives to improve energy efficiency

The mission of the Building Distribution Sector

DI Hermann HAUFMANN

eurokapi

AWARENESS-RAISING ACTIONS

Incentives to improve energy efficiency

In recent years, Saint-Gobain has been stepping up its awareness-raising activities among professionals, public authorities, and the general public about solutions to reduce CO_2 emissions from buildings.

In 2003, the Group's Insulation and Flat Glass Sectors helped found the **Isolons la Terre contre le CO_2** group in France (Let's insulate the earth against CO_2). Two similar groups were created in 2005: **Isoterra** in Belgium and **Spaar het klimaat** in the Netherlands. Saint-Gobain Isover G+H launched a similar program called **CO_2NTRA** in Germany.

In 2006, the **Isolons la Terre contre le CO_2** group helped create the **Effinergie** label, which provides certification for new and renovated buildings with very low energy consumption. Concerned actors from all relevant fields—including building professionals, government agencies, local authorities and banks—joined forces to make possible this drive to raise the energy efficiency of buildings.

> **Saint-Gobain's contribution** to a handbook on sustainable urban planning for China

Three Saint-Gobain companies—Saint-Gobain Isover, Saint-Gobain Weber and Saint-Gobain Glass—provided input for "The Sustainable Design Handbook China", a 400-page work on available construction materials that are able to reduce the environmental impact of buildings. The bilingual English-Chinese publication, commissioned by the Chinese Ministry of Construction from CSTB (the French scientific and technical center dedicated to construction) addresses sustainable urban planning for Chinese towns. Research scientists, engineers, town planners and architects from France and China provided input for this handbook which aims at transfering French sustainable construction practices to China, where know-how and products are sourced from France and other European countries.

The Building Distribution Sector's mission

The Building Distribution Sector plays a key role in educating both tradespeople and the general public on the environmental aspects of selecting and using building materials.

Carnets de chantier, the quarterly magazine published by Point.P for trade partners, includes a full feature on sustainable development in each issue.

Point.P has also set up waste sorting facilities that help raise awareness among building professionals concerning environmentally appropriate ways of cleaning up construction and demolition sites, in addition to offering improved safety and convenience.

In the UK, **Graham** has launched a dedicated renewable energies banner called **Greenworks.** The first store has already opened in Nottingham, and other locations are planned.

Finally, through its sales outlets, Saint-Gobain provides the general public with information on the environment. **Lapeyre** has launched several awareness-raising campaigns on wood and the forests. These are promoted by the **"Bilibois"** character in specially dedicated in-store areas to encourage children and their parents to **"change the way they look at the forest",** thus learning to respect and preserve it.

GREEN WORKS
RENEWABLE ENERGY SOLUTIONS

> Greenworks, the first renewable energies store.

Greenworks sells thermal solar collectors, photovoltaic panels, heat pumps, wind turbines, Unico heating, cooling systems, rainwater collection systems and biomass boilers. Comprised of a contractor information area, a small showroom and a product warehouse, Greenworks offers tradespeople training on renewable-energy products that call for special know-how.

INDUSTRIAL PROCESSES

Enhancing our industrial processes to help save energy and preserve the environment

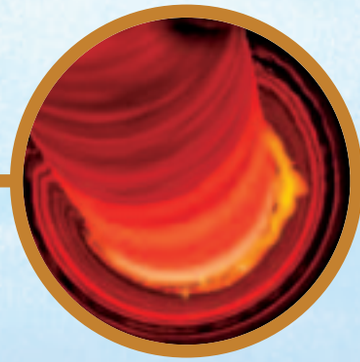
Saint-Gobain's industrial operations generate relatively few technological risks. For the most part, they involve the processing of inorganic materials and require practically no environmentally hazardous substances.

The main concern for Saint-Gobain, as for many manufacturers, is CO_2: 74 Group facilities are concerned by the European directive on emission quotas, which is in its initial application phase (2005-2007). Saint-Gobain's emissions remain marginal, accounting for only 0.3% of quotas allocated in Europe and amounting to less than 15 million metric tons in 2006.

Saint-Gobain has set itself two objectives as part of its environmental policy:

– Reducing energy consumption and greenhouse gas emissions in its industrial and transport operations.
– Optimizing its use of raw materials in industrial operations, which includes control of industrial waste, internal recycling, and designing products to be recyclable at the end of their lifespan.

Reducing transport-related
CO_2 emissions



Managing natural resources

Managing waste
and promoting
recycling

Reducing energy
consumption
and emissions
of pollutants

Reducing energy consumption and emissions of pollutants

Saint-Gobain constantly strives to enhance its industrial processes to limit air pollution

Saint-Gobain endeavors to minimize air pollution caused by the manufacturing processes used to produce glass, pipes and certain industrial ceramics. Furnaces, where temperatures can exceed 1,600°C (2,900°F), emit carbon dioxide and generate atmospheric pollutants such as nitrous oxides (NOx) and sulfur oxides (SOx).

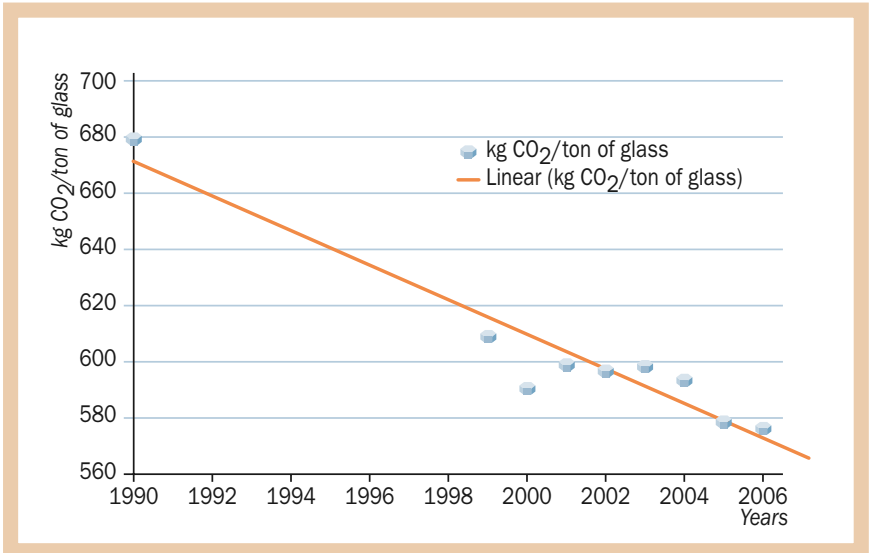
Drawing from several centuries of glassmaking experience, Saint-Gobain furnaces use state-of-the-art methods that optimize both yields and energy consumption. To further raise the environmental performance of glass-melting processes for current and future furnaces, an innovative project has been launched to develop breakthrough technologies that save energy, reduce CO_2 emissions, recycle products and waste, and optimize combustion in order to reduce NOx emissions and facilitate fume-scrubbing steps.

All of Saint-Gobain's glassmaking sites in France have joined AERES (a French grouping of companies for reducing the greenhouse effect) and have decreased their individual CO_2 emissions by 15% since 1990.

Cast iron melting process.

Float.

To cut down on dust, Saint-Gobain has invested heavily in equipment for treating gas effluent, such as electrostatic precipitators or bag filters, depending on the type of furnace involved. By using recycled materials, collecting any dust generated, treating fumes, and recycling water, the Isover production sites do the utmost to reduce any discharges during the manufacture of mineral wool.
The widespread use of cullet—crushed recycled glass garnered from windows, automotive glazing, bottles etc.—in the manufacture of glass wool reduces the need of natural resources and energy in the glass-melting process.



Specific emissions in France.

Reducing transport-related CO_2 emissions

Saint-Gobain has developed a policy of decentralizing its outlets. It enables the Group to get closer to the customer and therefore reduce the amount of transportation.

Transport remains unavoidable for transferring raw materials to the plants and finished products to the sales outlets.

The **Distribution Sector's** sales activities require it to transport construction materials to the sales outlets. For this reason it has launched a study to accurately measure the related CO_2 emissions. **Point.P** provides classes on economical driving for all new recruits.

Raab Karcher:
brand of the Bulding
Distribution sector.

> **Compressing** glass wool

The Insulation Division has developed a patented process for compressing glass wool. Thanks to their elastic properties, products can be compressed by a factor of up to ten at the time of packaging (in rolls) and palletizing. This process offers numerous advantages in terms of:

- **simpler logistics and lower transport costs;**
- **ease and safety of handling on construction sites when laying glass wool;**
- **streamlined waste management, due to the reduction in packaging materials.**

Actions are also underway in industrial operations. The **Flat Glass Sector,** for example, is extending its use of rail transport to transfer products between sites. In 2006, transporting glass by rail meant 1,720 fewer truck journeys.

Saint-Gobain Glass carriage for transferring products between sites.

METRIC TONS OF PRODUCTS **TRANSPORTED BY RAIL**

Year	Tonnage
2004	6,500
2005	11,000
2006	**39,000**

The CO_2 emissions rating is a key factor in the choice of company vehicles by the French entities. Saint-Gobain's purchasing function also launched a study of its existing fleet's CO_2 emissions in France, with a view to reducing them. These initiatives are due to be rolled out to other countries.

Spotlight on...

> Saint-Gobain Auvelais and river transport

The Saint-Gobain Glass plant at Auvelais, in Belgium, was commended by the Belgian Office for the Promotion of Navigable Waterways in 2006. Each year, this organization rewards the most significant improvement in the use of river transport in Belgium.

After having invested in developing the banks of the Sambre river, Saint-Gobain Glass Auvelais shipped by river over 170,000 metric tons of glassmaking sand in 2005, compared with 61,000 in 2004. Each barge can transport the equivalent of 20 trucks, resulting in a considerable decrease in CO_2 emissions.

Comparison between equal quantities of compressed and non-compressed materials.

INDUSTRIAL **PROCESSES**

Managing natural resources

Preserving biodiversity is a genuine concern for Saint-Gobain, since natural raw materials are present in almost all of its products.

Sand or basalt is used for mineral wool, gypsum for plasterboard, iron ore and coal for cast iron, and wood for a substantial portion of the Building Distribution Sector's products. Water is used in very few of our manufacturing processes, although it is used for cooling high-temperature facilities.

OPTIMIZING RESOURCE **USE THROUGH CUTTING-EDGE PROCESSES**

■ Water

Saint-Gobain is aiming to minimize groundwater extraction as much as possible by increasing the use of closed circuits. Some sites, such as the Chennai plant in India (see Spotlight), go even further.

Rainwater collection basin in Chennai, India.

Research and Development work on reducing water consumption is underway in many areas.

The Pipe Division designed a new process for applying cement mortar coatings on the inside of pipes, which uses less water and generates less mud.

As for glass production, Saint-Gobain Sekurit has decreased its water consumption by 2% per year by increasing the use of closed circuit systems and investing in new equipment that consumes less water.

■ Wood

In 2006, the Saint-Gobain Building Distribution Sector bought more than 3.5 million cubic meters of wood and wood panels, 94% of the total sourced from temperate forests and the remaining 6% being tropical woods. Lapeyre and Point.P in France, Jewson in the United Kingdom and Optimera in Norway together account for 90% of the Building Distribution Sector's wood purchases. For several years now these outlets have been running their own control policy regarding timber supplies. A sector-wide environmental policy on wood is now being set up to ensure responsible behavior in both purchasing and sales.

Responsible purchasing aims to protect endangered tree species, to provide assurance that wood is legally sourced and to promote certified sourcing in accordance with the sustainable forestry standards of the Forest Stewardship Council and the Program for the Endorsement of Forest Certification Schemes.

To encourage **responsible selling,** sales personnel are trained and customers are informed of the ecological benefits of wood and of the traceability of the products (species, origin, certification if applicable, etc.).

Spotlight on...

> The Chennai plant

The flat glass plant in Chennai, India, has a rainwater collection basin with a capacity of some 58,000 cubic meters, equal to 100 days' water consumption at the plant.

> The Pont-à-Mousson plant

The watertightness of Saint-Gobain PAM's cast iron pipe systems considerably reduces the risk of leaks during use. The metal used in these pipes is more intrinsically robust than organic materials and provides greater resistance to corrosion.

Sustanably managed forest.

Managing natural resources

■ Minerals

Saint-Gobain operates **120 underground or open-cast quarries** worldwide. Two-thirds of these are gypsum quarries, with extracts used mainly for plasterboard. The quarries are operated in an environmentally friendly manner in compliance with local and national regulations.

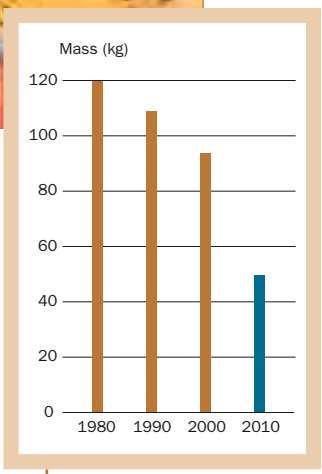
During the extraction period, the effects on local residents and on the environment are reduced as far as possible. Particular attention is paid to the visual impact of the operations, dust, noise and vibrations, the bearing on road traffic, and any hydrogeological and hydrographic repercussions.

When extraction has been completed, a site is systematically cleaned up. The objective for open-cast quarries is to return the land to as close to its initial contours as possible. The entire zone is then replanted, with high density wooded areas composed of various species, woodlands, and meadows or ponds, to create biodiversity. Since the start of the 1990s, the Gypsum Division in France has redeveloped more than 200 hectares (495 acres) of open-cast quarries in the greater Paris region and planted more than 100,000 trees.

Quarry during the extraction period.

Quarry once the extraction has been completed.

Gypsum recycling.



Example of how Saint-Gobain PAM lightens its products: changes in the mass of a DN 100 pipe.

MAKING PRODUCTS **LIGHTER AND MORE DURABLE**

This is one aim of the Saint-Gobain Group's Research and Development teams.

In the Pipe Division the changeover from grey cast iron to the more resistant and flexible ductile cast iron was a major breakthrough at the start of the 1950s. Pipes and fittings have been made continually lighter thanks to improved control over the thickness of the materials and the development of new, improved anti-corrosion coatings. For example, the Natural pipe weighs 25% less per linear meter than the K9 pipe, produced 15 years earlier.

By aiming to make its products more durable, the Pipe Division has developed new exterior coatings which ensure that buried pipes last on average three times longer than before. These coatings are effective in more than 95% of soils. The Group estimates that energy and raw material consumption per meter of piping and per year of operation has been reduced fourfold since 1990.

In response to the expectations of automakers, major strides have also been made in reducing the weight of automotive glazing, leading to a reduction in the weight of vehicles and, accordingly, in gas consumption and CO_2 emissions (see page 16).

INDUSTRIAL **PROCESSES**

Managing waste and promoting recycling

Saint-Gobain's three main materials—glass, cast iron and gypsum—can be recycled indefinitely.

Through recycling, the Flat Glass Sector's European operations save almost 300,000 metric tons of raw materials per year, thereby avoiding 70,000 metric tons of CO_2 emissions.

The Group makes a considerable effort to promote recycling, which brings the twofold environmental benefits of waste minimization and reduced consumption of primary raw materials. Recycling is partly carried out by specialized Group subsidiaries.

Valoref, for example, is the European leader in the recycling of refractory products (glass furnace coatings). The materials recovered are processed, transformed and re-used as secondary raw materials in the construction of new furnaces or in the form of powders and pellets sold to refractory manufacturers (6,000 metric tons per year). Valoref clients include the majority of Europe's glass-making groups as well as nearly all of the world's major producers of refractories.

Samin, a Saint-Gobain company, recycles household glass purchased from local authorities. The glass is sorted by sophisticated electronic machinery which extracts the impurities. Once the glass has

An Italian campaign to promote segregated waste collection, organized by Coreve, the Italian association for glass recycling, in association with Saint-Gobain.
Campaign carried out by Sculoa di Pirella, Coreve.
(Photo: Carlo Facchini)

been processed it is re-used in glass furnaces. Samin processes 450,000 of the 2 million metric tons of household glass collected in France each year.

Saint-Gobain takes part—along with local and national glass producers' federations—in campaigns designed to promote household glass recycling. The quantities of cullet recovered doubled between 2000 and 2006. To prevent dust emissions, Saint-Gobain plants filter dust—in particular dust from raw materials—and recycles it.

THE USE **OF SECONDARY RAW MATERIALS**

These materials are created from recycled primary raw materials, such as cullet for glass and scrap metal for cast iron. The use of secondary raw materials combined with improved manufacturing processes helps reduce the consumption of natural resources and the volume of waste to be disposed of. Each metric ton of cullet used prevents some 500 kilograms of CO_2 emissions.

Saint-Gobain is constantly seeking out new avenues for the re-use of waste.

Some 30% of flat glass and 50% of mineral wool are currently produced from recycled glass

Two million metric tons of glass are recycled this way each year.

THE USE **OF ALTERNATIVE RAW MATERIALS**

The Pipe Division uses a **secondary melting process** which produces liquid metal from scrap metal and recovered cast iron, in cupola or electric furnaces.

Saint-Gobain Weber offers mortars made from foamed glass aggregate (produced from cullet), which has several advantages in environmental terms. Apart from the fact that recycled glass replaces a portion of the sand extracted from quarries, the products are also lighter. The end result is that work that required a 25 kilogram bag of mortar several years ago now only requires a 15 kilogram bag.

Gypsum can also be recycled indefinitely. The only difficulty encountered, as with cullet, is at the waste sorting stage. Waste recycling systems have already been put in place in the United Kingdom, Austria and Scandinavia, and similar arrangements are in the pipeline for Belgium and France.

This system can be as comprehensive as local conditions and demand allow. In the United Kingdom, for example, a full service is offered, from on-site collection to re-use of gypsum, and includes a mechanical sorting process that separates paper from cellulose and other components. This service is managed by a specific department within **British Gypsum.**

> Ri-cycling **program**

In Austria, a program called "Ri-cycling" meets dual aims of environmental protection and cost reduction. Large Ri-cycling bags are now delivered to Rigips customers along with their plasterboard. These bags can be used to collect waste generated on the construction site, which is then re-introduced into the production cycle.


SAINT-GOBAIN

SAINT-GOBAIN
AND THE ENVIRONMENT

Saint-Gobain's development is based on the Group's Principles of Conduct and Action, which were formalized and adopted by the Board of Directors in January 2003. The application of these Principles is a requirement for belonging to the Saint-Gobain Group.

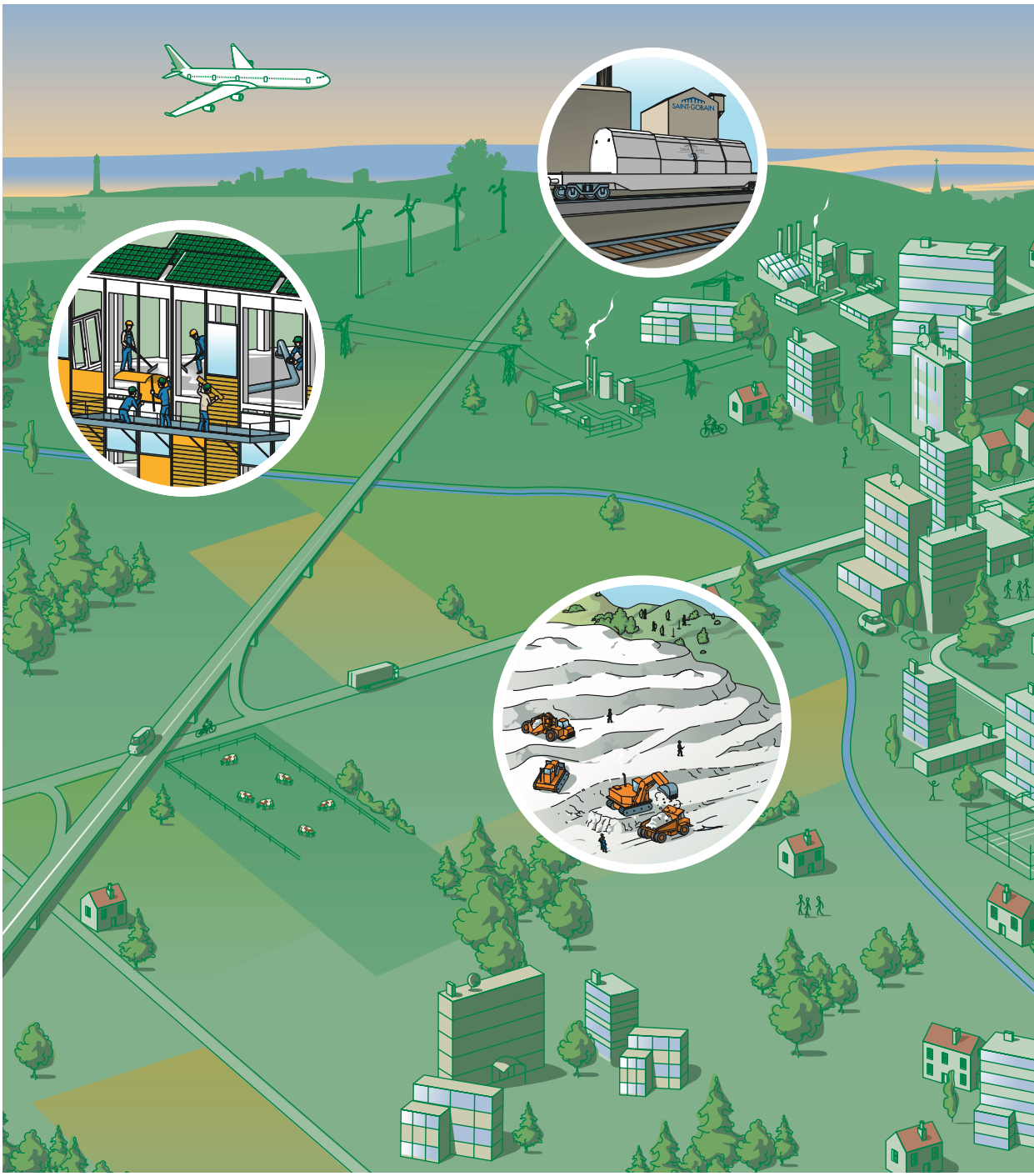
Five of the principles concern individual conduct and four of them concern professional conduct, including caring for the environment.

Caring for the environment

Group companies proactively endeavor to protect the natural environment.

All facilities, regardless of location, implement site management methods that allow measurable environmental performance standards to be set, and actual performance to be regularly evaluated and checked against the applicable standards.

Local teams strive to raise the main relevant environmental performance indicators of their own sites to the levels achieved by particularly efficient Group facilities with comparable operations—even if that means going beyond the requirements of local legislation.

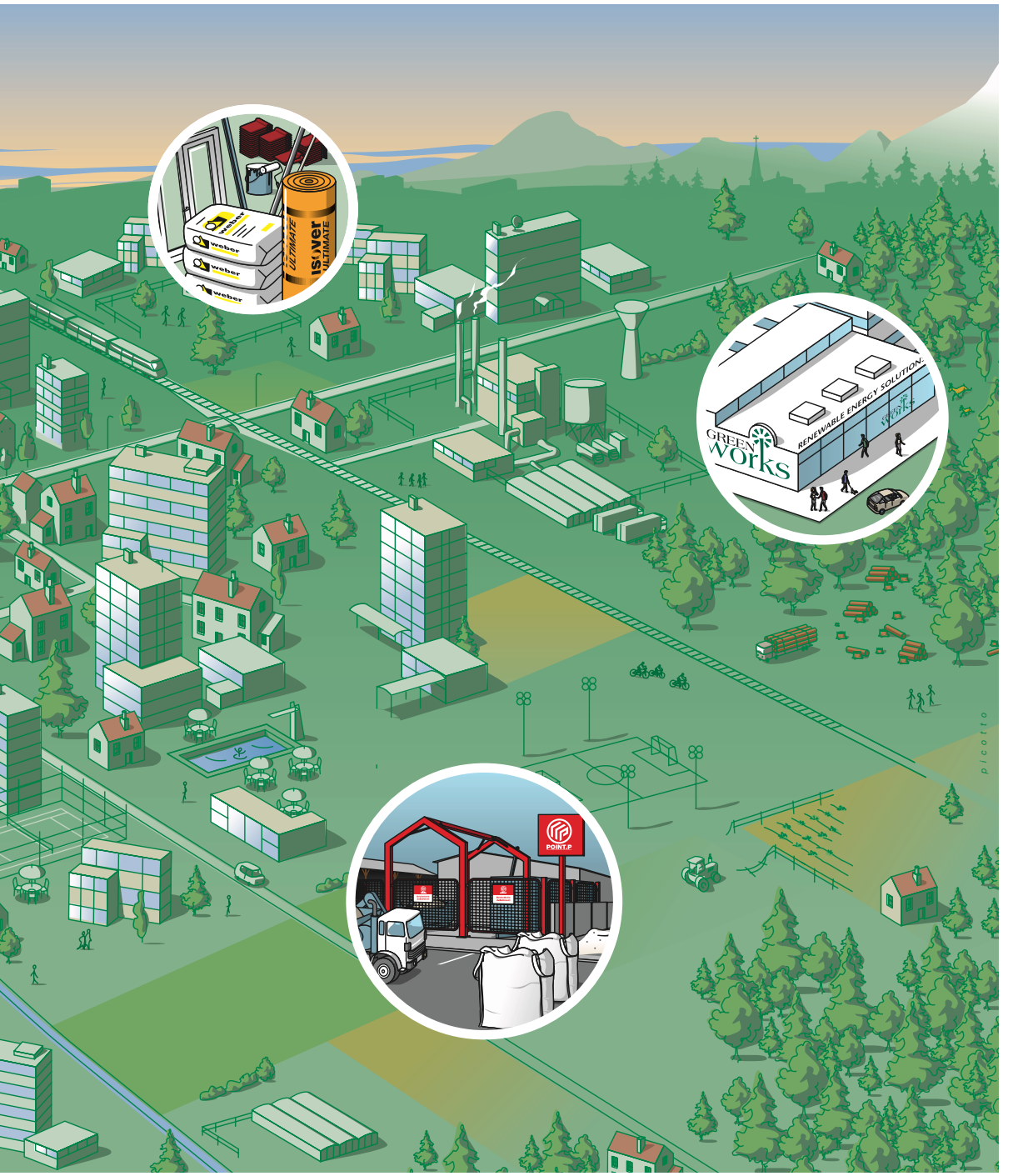


Products and services that reduce the environmental impact of buildings

- construction products that save energy and improve comfort and quality of life (indoor air ventilation, thermal and acoustic insulation, fire-resistant properties): mineral wool coupled with plasterboard-based systems, insulated double glazing, exterior wall facings
- raising awareness among industry professionals and providing them with information; creating Greenworks, an outlet specialized in renewable energies
- raising awareness among the general public and public authorities
- providing a waste sorting and recycling service for construction industry professionals

Preserving natural resources

- implementing responsible practices for purchasing and selling wood
- managing quarries during and after extraction operations
- controlling water consumption at plants; developing products that contribute to improving water management and quality (PAM)
- promoting recycling both within and outside the Group (glass, scrap iron, gypsum, refractories)
- improving production processes and making products lighter



Reducing the environmental impact of our industrial plants and distribution sites

- regulating atmospheric emissions at industrial plants (CO_2, NOx, SOx, dust)
- reducing transport-related CO_2 emissions (Building Distribution Sector)
- waste management

Solar panels: contributing to the production of renewable energies

- solar energy
- fuel cells (research project)

Cars: reducing the environmental impact of vehicles

- lighter and more aerodynamic automotive glazing
- particulate filters for diesel engines
- automotive glazing that allows improve thermal regulation of vehicles
- increased safety (improved visibility, better protection against traffic infractions)

In 2004, this principle, along with the principle of ensuring worker health and safety, was set out in the Saint-Gobain Group's Environment, Health and Safety Charter. The Charter, a copy of which is posted at all Saint-Gobain sites, epitomizes the Group's focus on constant progress, particularly in environmental matters. To date, it has been translated into 30 languages.

THE GLOBAL COMPACT

Saint-Gobain and the Global Compact

Saint-Gobain wished to make clear that it belongs to a global community of corporate citizens who uphold the key values of respect for human rights, environmental protection and anti-corruption. It joined the Global Compact in July 2003.

http://www.unglobalcompact.org/

SAINT-GOBAIN

Les Miroirs - 18, avenue d'Alsace 92096 La Défense Cedex - France
www.saint-gobain.com

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Printed on IMP Graphic presses (Cosne-sur-Loire, France) using vegetable-based inks and PEFC-certified paper.
Imprim'vert, ISO 9001, ISO 14001 and OHSAS 18001-certified printer.